Digital Object Identifier

A Handle Implementation

Norman Paskin, International DOI Foundation

doi>

What is DOI?

Digital

Object

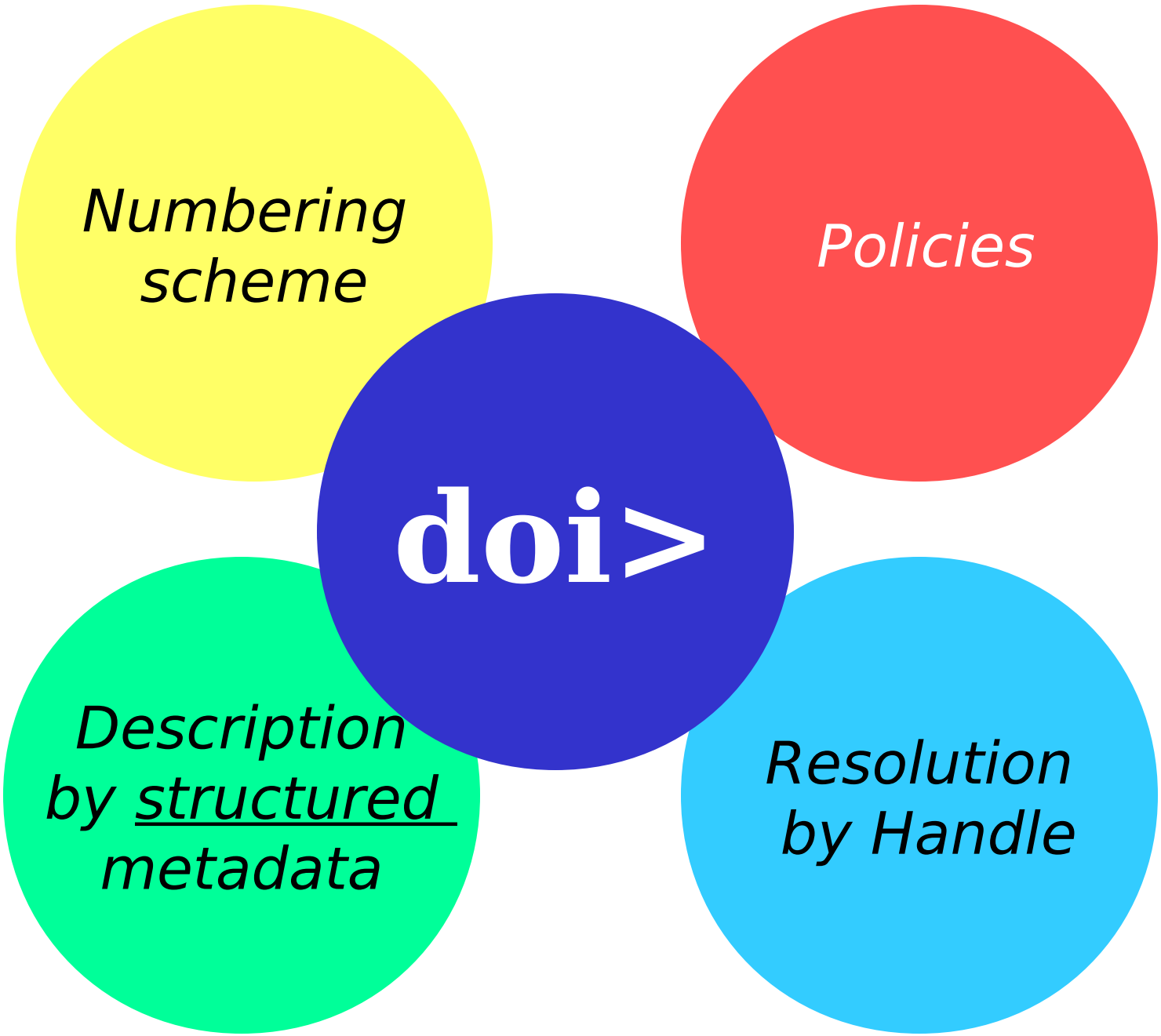
Identifier

- A unique identifier for "a piece of content“ on digital networks
- Digital object *interoperability*

Handle and DOI

- DOI – a Handle implementation
- DOI – more than a Handle implementation:

  uses Handle as one component, of several that make up the DOI system
- analogy:
  - engine and car?


Numbering scheme
Policies
doi>
Description by structured metadata
Resolution by Handle

Analogy: the physical bar code

doi>

- A unique identifier for "a piece of content" in the physical world
- single, common system: UPC/EAN Bar Code
- components: *code writers, readers, policies, etc.*
- many uses : once assigned, *usable by anyone* in chain
- wide community support made it work
- self-sustaining cost recovery model etc.
- standard – helps to integrate systems efficiently

What is the DOI?

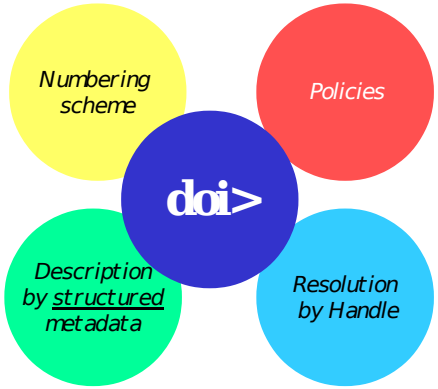
"The DOI is the UPC (Bar Code) for objects of intellectual property on the Internet."

- 1. Uniquely identifies *"content"*
  - enables management of transactions of all kinds
- 2. Provides a stable, persistent link
  - to the content itself *or to services*
- 3. Can be used to articulate services as real world applications
  - using metadata, multiple resolution, rules, etc.

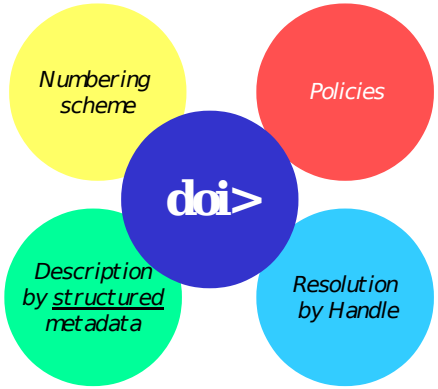
This presentation

- Show DOI as combination of components
  - use existing standards including Handle
- Show examples of services (applications) built on DOI
  - Examples here web–based
  - but DOI applicable to all platforms

DOI syntax
can include **any existing identifier**,
formal or informal,
of any entity

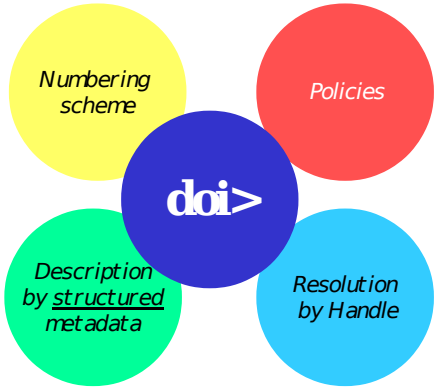


- An identifier “container” e.g.
- 10.1234/5678
- 10.2341/0-7645-4889-1
- 10.5678/978-0-7645-4889-4
- 10.1000/ISBN 0764548891
- 10.1234/Norman_presentation
- 10.2224/2003-1-29-CENDI-DOI
- etc



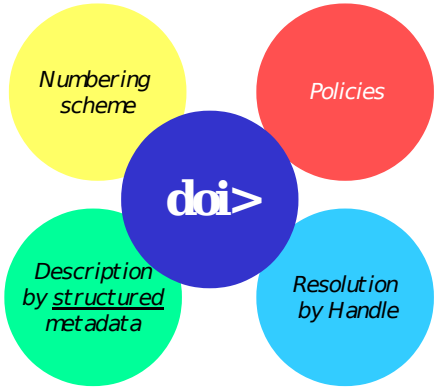
- Resolve from DOI to:
  - Location (URL) – *persistence*
- Resolve to multiple data:
  - Multiple locations
  - Metadata
  - Services
  - Nested DOIs (related objects etc)
  - Extensible: new types

Handle resolution
allows a DOI to link to
any & multiple pieces
of current data



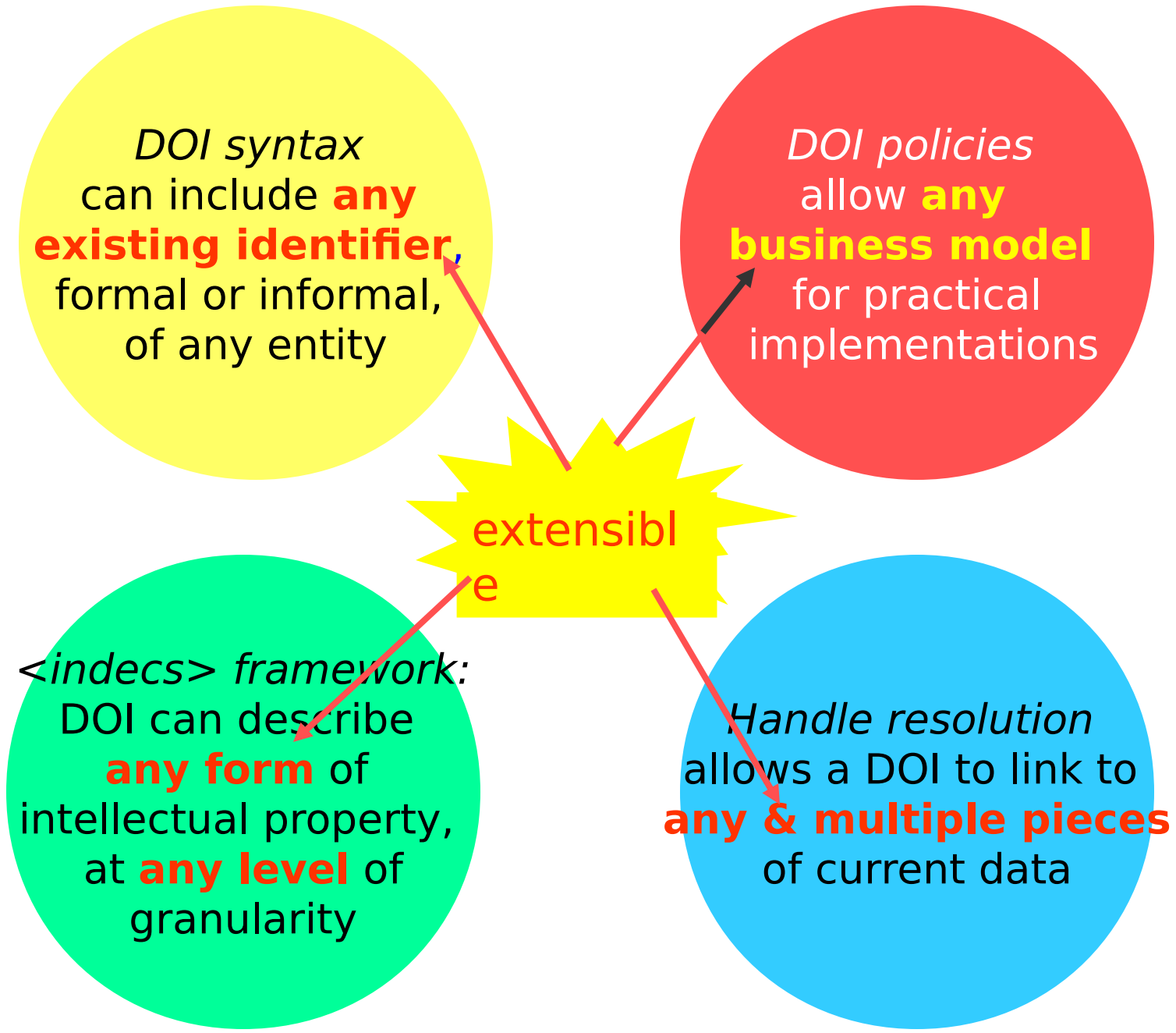
- Metadata
- For interoperability
- Kernel metadata
  - A standard, interoperable, small set of data
- Able to use existing metadata
  - Mapped using standard dictionary
- Providing a standard way of accessing and using the object
  - “Hooks” to Open URL, UDDI, etc
  - DOI Applications, Services

<indecs> framework:
DOI can describe
any form of
intellectual property,
at **any level** of
granularity

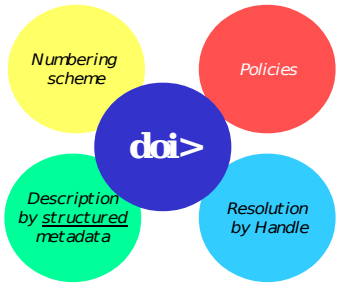


DOI policies allow **any business model** for practical implementations

- Common rules of the road (IDF)
  - Governance and agreed scope, policy, rules
- Cost-recovery (self-sustaining)
- Registration agencies (cf ISBN, Visa)
- Each can develop own applications, services, sector rules, business model, fees, metadata etc
  - DOI at cost
  - DOI free
  - DOI with other services
  - etc


DOI syntax
can include **any existing identifier**, formal or informal, of any entity
DOI policies
allow **any business model** for practical implementations
extensibl
e
<indecs> framework:
DOI can describe **any form** of intellectual property, at **any level** of granularity
Handle resolution
allows a DOI to link to **any & multiple pieces** of current data

DOI components



- The combination of components is unique
- Aim to use *existing standards* or, if not available, to *develop standards* with others
  - Numbering: standard principles
    (Naming authorities, delegated responsibility, uniqueness, non-intelligent numbering, etc)
  - Resolution: DOI is a Handle implementation
    (Initially single, now multiple resolution; close collaboration with CNRI as technology partner)
  - Metadata: indecs framework
    (Initially <indecs> consortium, now ISO MPEG)
  - Policies: based on similar business models
    (UPC, ISBN, Visa, etc.)

DOI: development path

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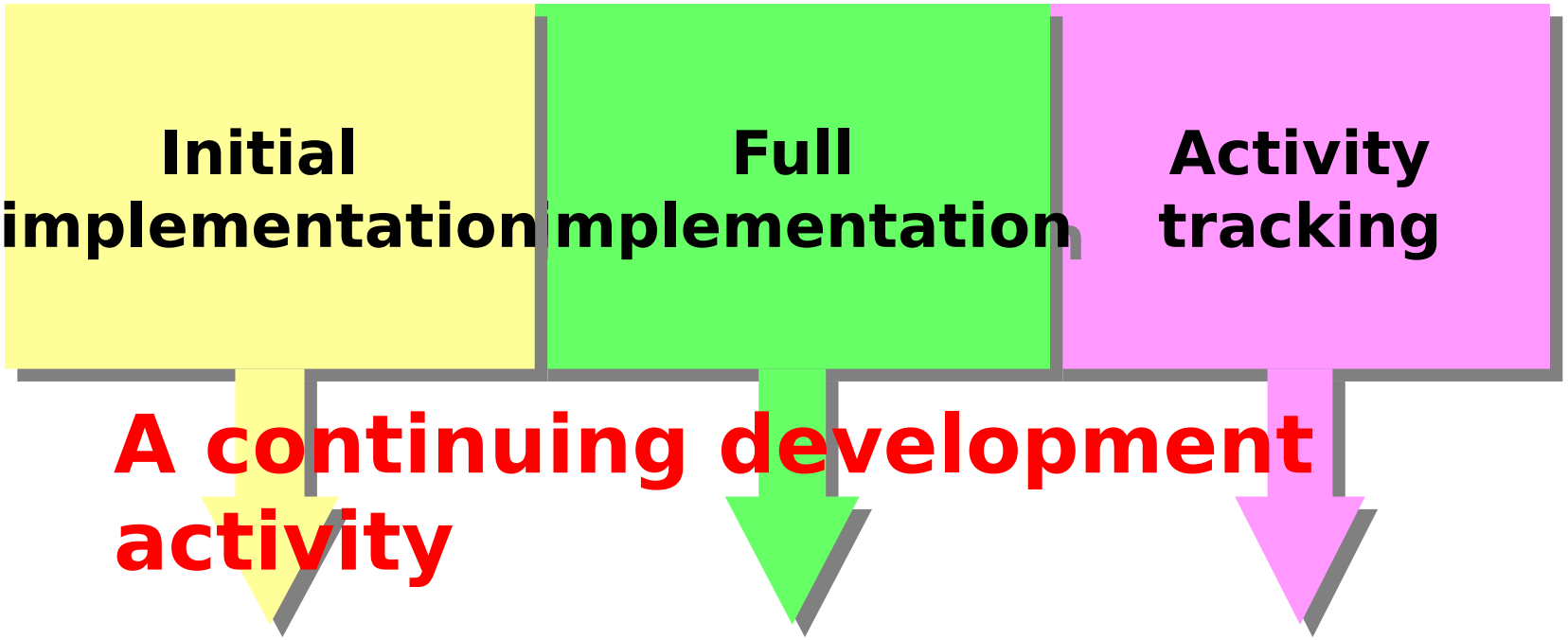
Single redirection
(persistent identifier

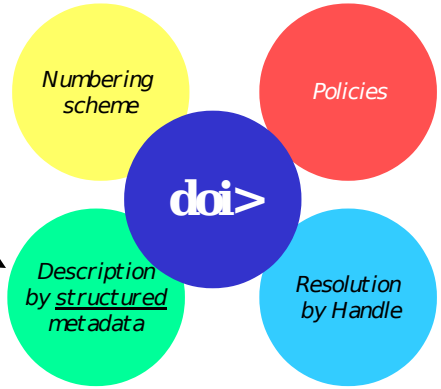
Metadata

Multiple resolution

W3C, WIPO,
NISO, ISO,
MPEG etc.



The “metadata” component



- “Interoperability of data in e-commerce systems”
- <in*d*ecs> – a multi-partner effort: see www.indecs.org
- Became adopted and now basis of ISO MPEG-21 Dictionary approach: see the paper “Towards a Rights Data Dictionary”

- Unique Identification
- Functional Granularity
- Designated Authority
- Appropriate Access
- Metadata as “a relationship between two entities”

The “metadata” component

Why this has been important to DOI

- Precision – a consistent extensible framework, for automation
- Terminology – defined scope “content” more precisely
  - In relation to “Digital Objects”, W3C “resources”, WIPO “works”:
  - description by precise attributes, ontology
- Ability to interoperate with any existing metadata
  - SCORM, MARC, ONIX, etc
- Link to standards work like MPEG, XML

- A way of defining “Application Profiles”
  - sets of metadata plus rules, a way of grouping DOIs
  - the basis of applications beyond simple persistence
  - documentation now being completed

Metadata efficiency

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- Text objects (ONIX)
- Art objects (CIDOC)
- Learning objects (SCORM)
- Audio objects (GRID)
- Video objects (SMPTE)
- etc

<indecs> framework:
in DOI can describe
any form of
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at **any level** of
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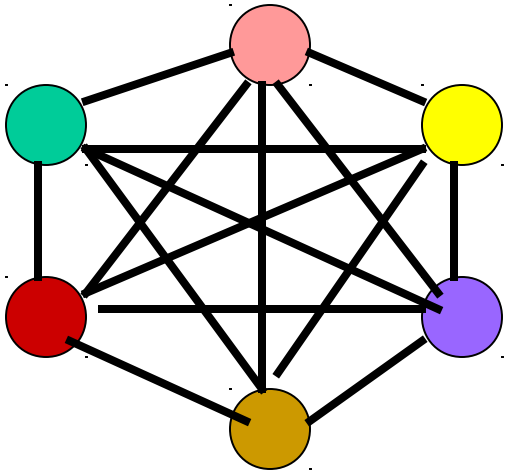

Metadata efficiency

doi>

- Text objects (ONIX)
- Art objects (CIDOC)
- Learning objects (SCORM)
- Audio objects (GRID)
- Video objects (SMPTE) etc
- Common single mapping

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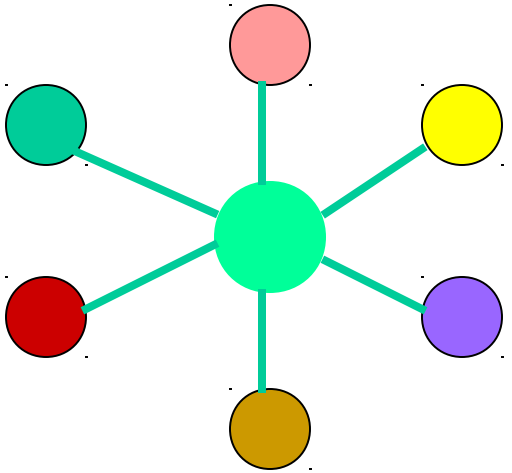

Adding value: services

- Acrobat plug-in as focus example here (web based)
- Four example demonstrations shown here:
  - Version (provide a dynamic update version of the pdf in hand)
  - Multiple resolution (retrieve multiple data: a URL and some metadata in this case)
  - CrossRef (retrieve a standard set of metadata and use it in an application, a citation builder)
  - Rights (very simple e-commerce interface as an illustration)

Adobe plug-in concept: what

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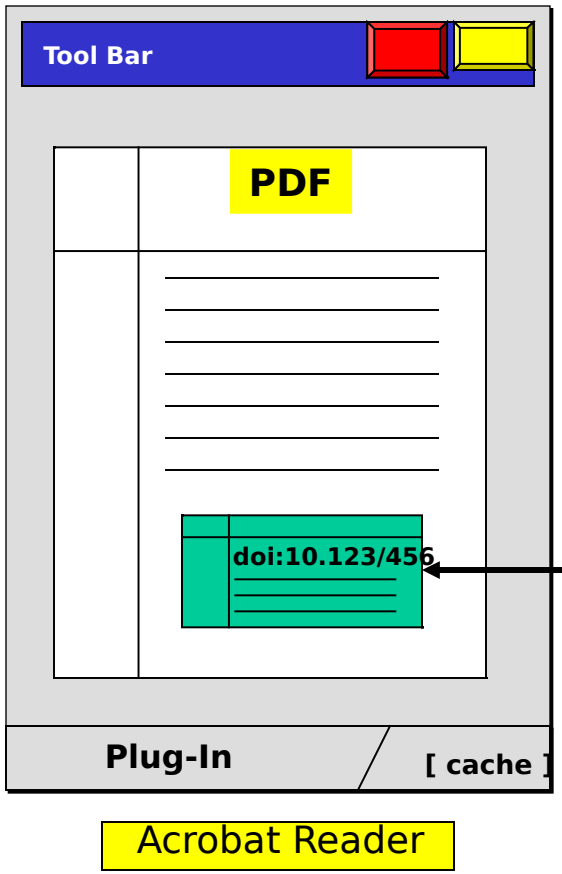


Buttons "pop up" dynamically as services become available

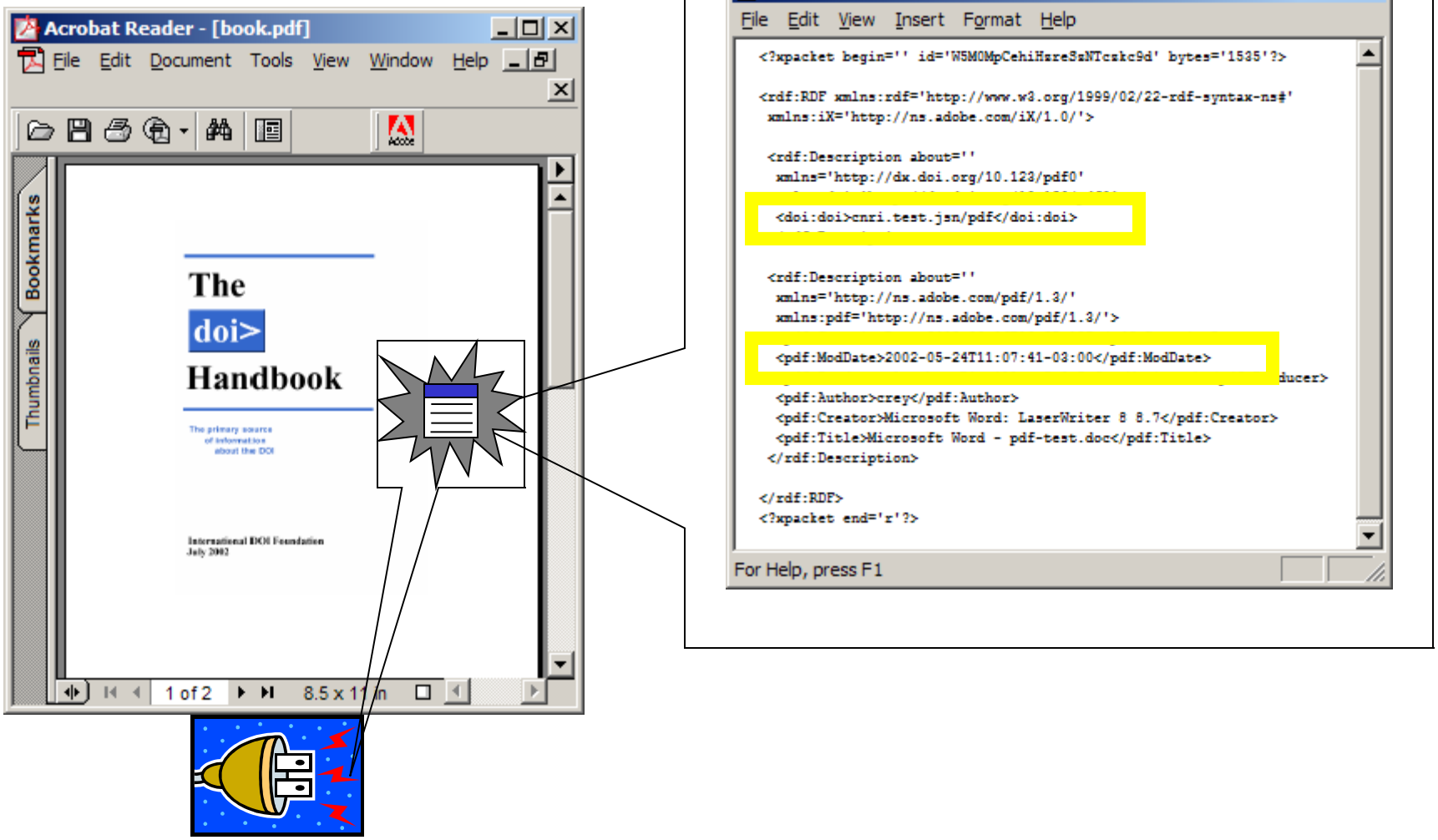
Forward Linking Service

AN Other Service

DOI is not visible - within pdf package (like File/Properties in Word, etc)

PDF document viewed through Acrobat reader

Demo 1 – “get latest version”



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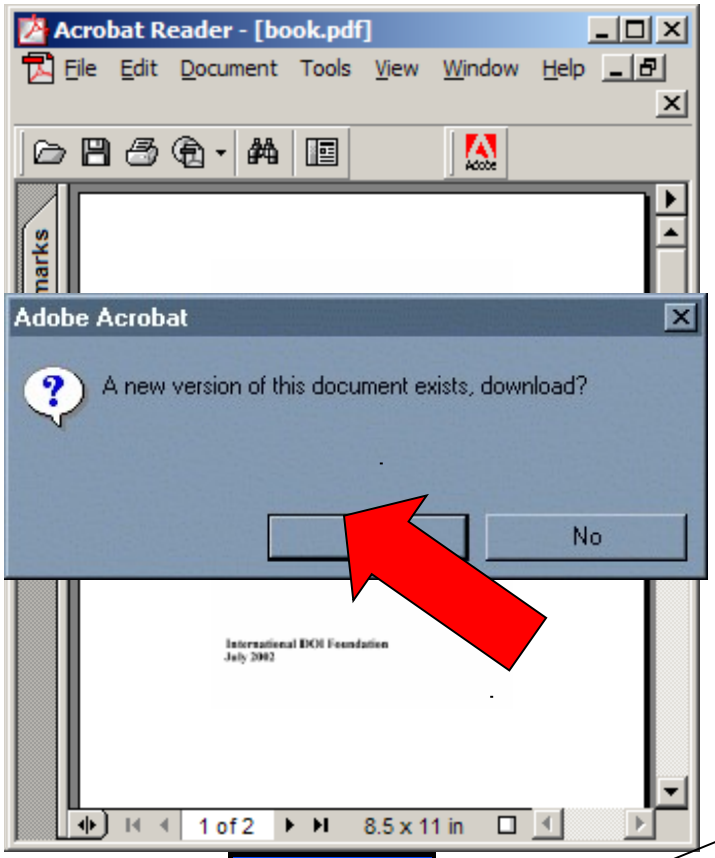

Acrobat Reader - [book.pdf]
File Edit Document Tools View Window Help
Adobe Acrobat
A new version of this document exists, download?
No
1 of 2
8.5 x 11 in

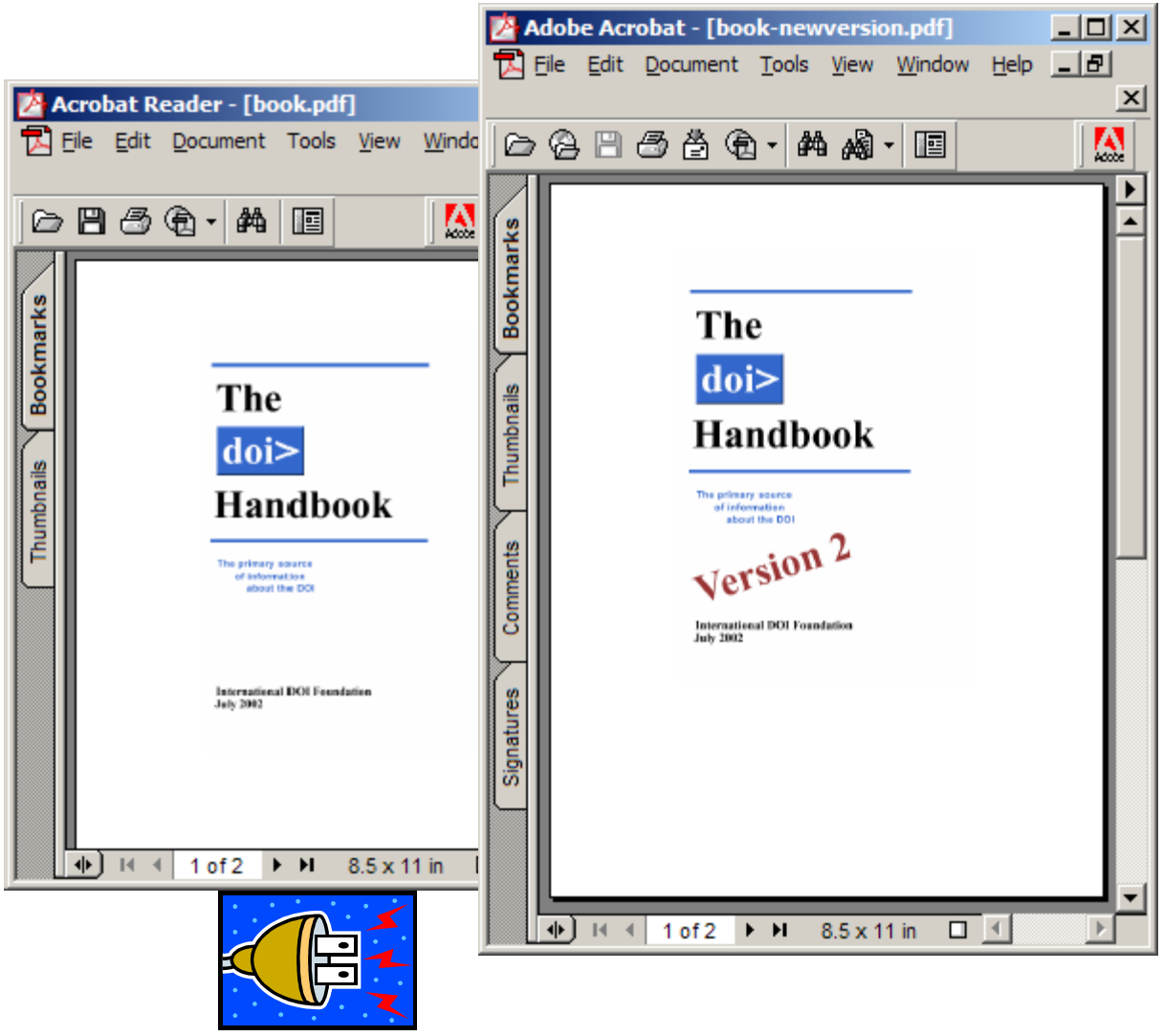
Handle Record

DOI	TYPE	DATA
cnri.test.jsn/pdf	url	http://host-4-211/book-newversion.pdf
	last_modified	2002-06-13T14:06:03-03:00

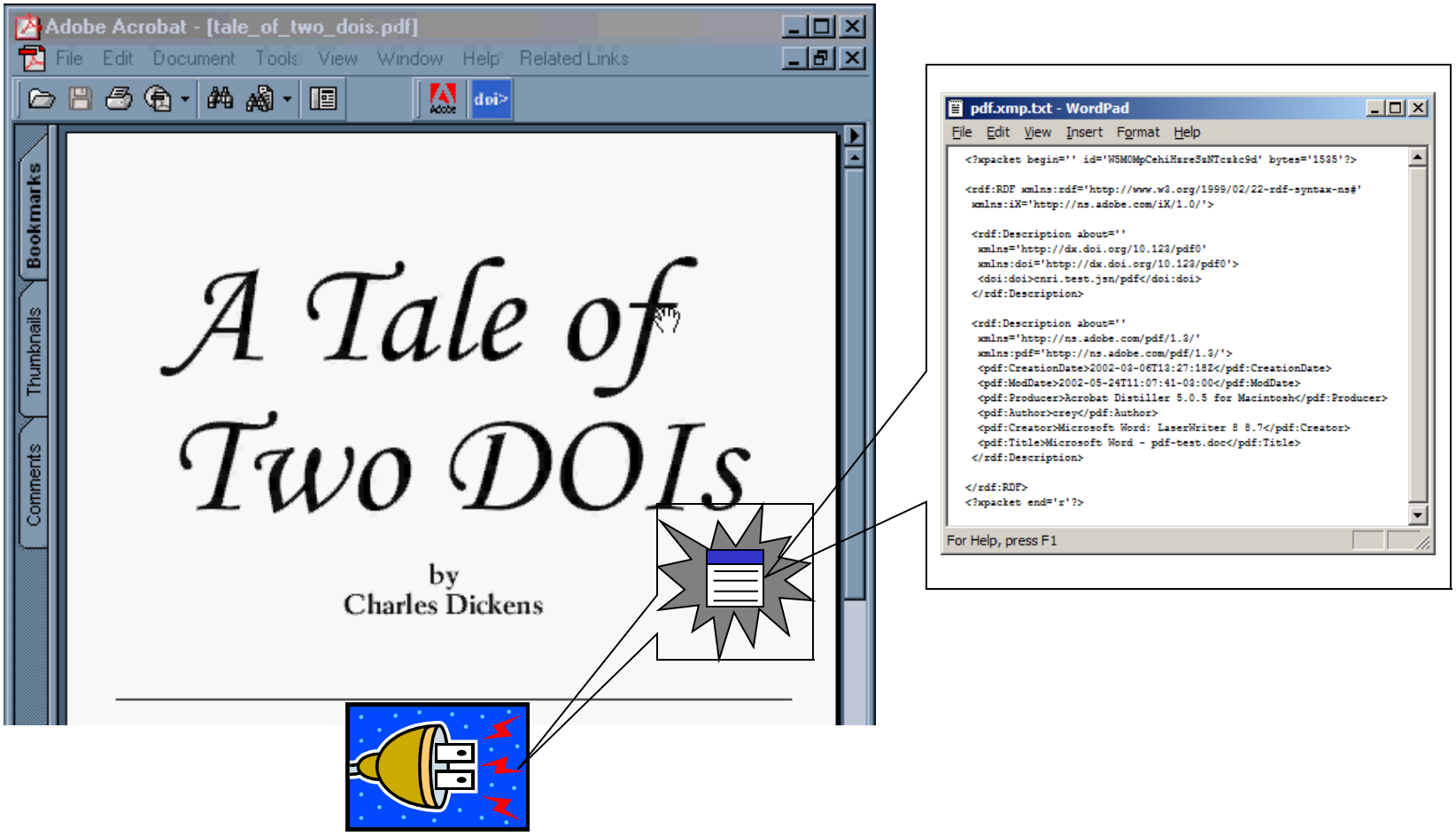
Handle System

Internet

Demo 1 – “get latest version”



Demo 2 – MultiRes



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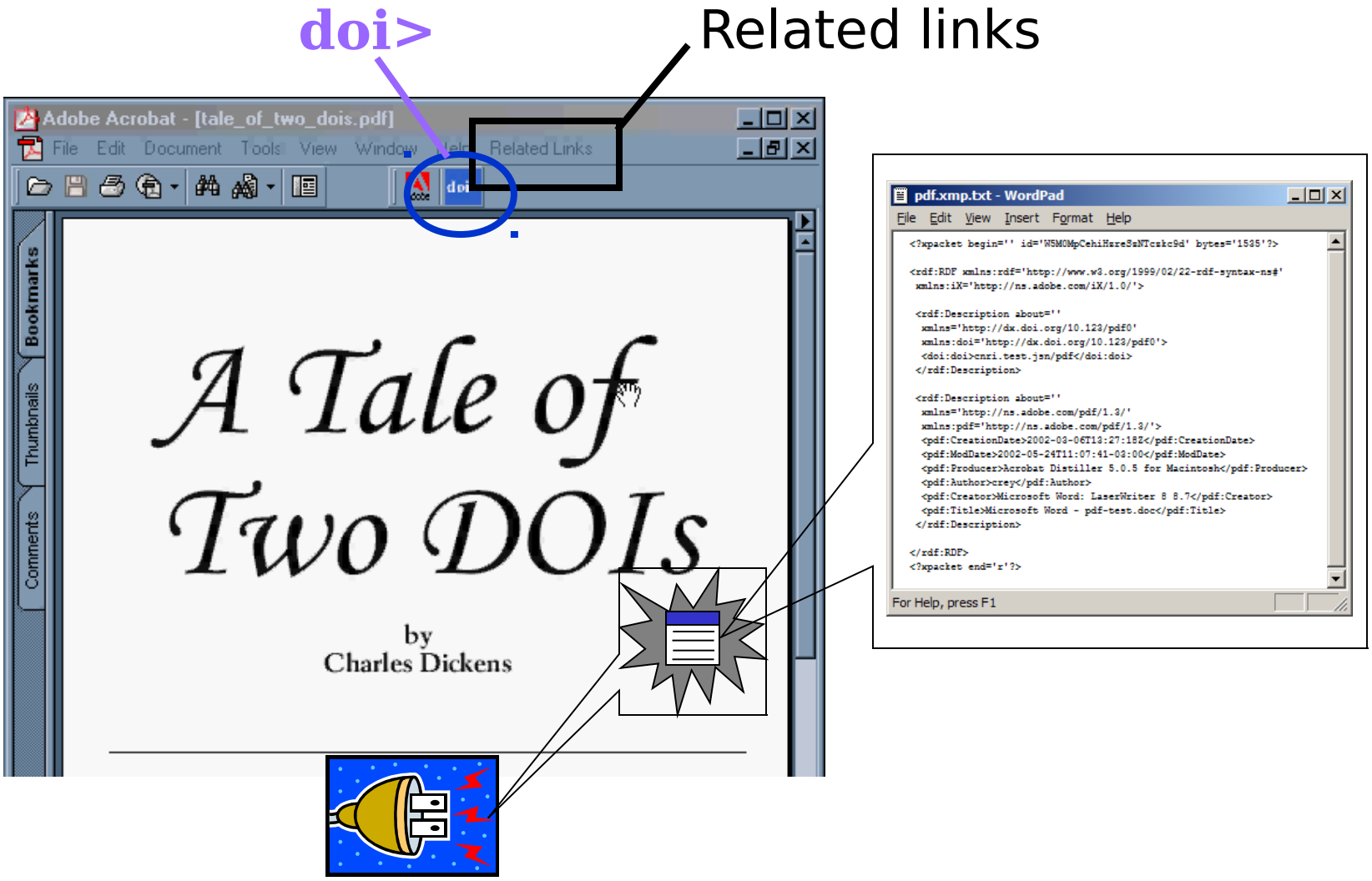

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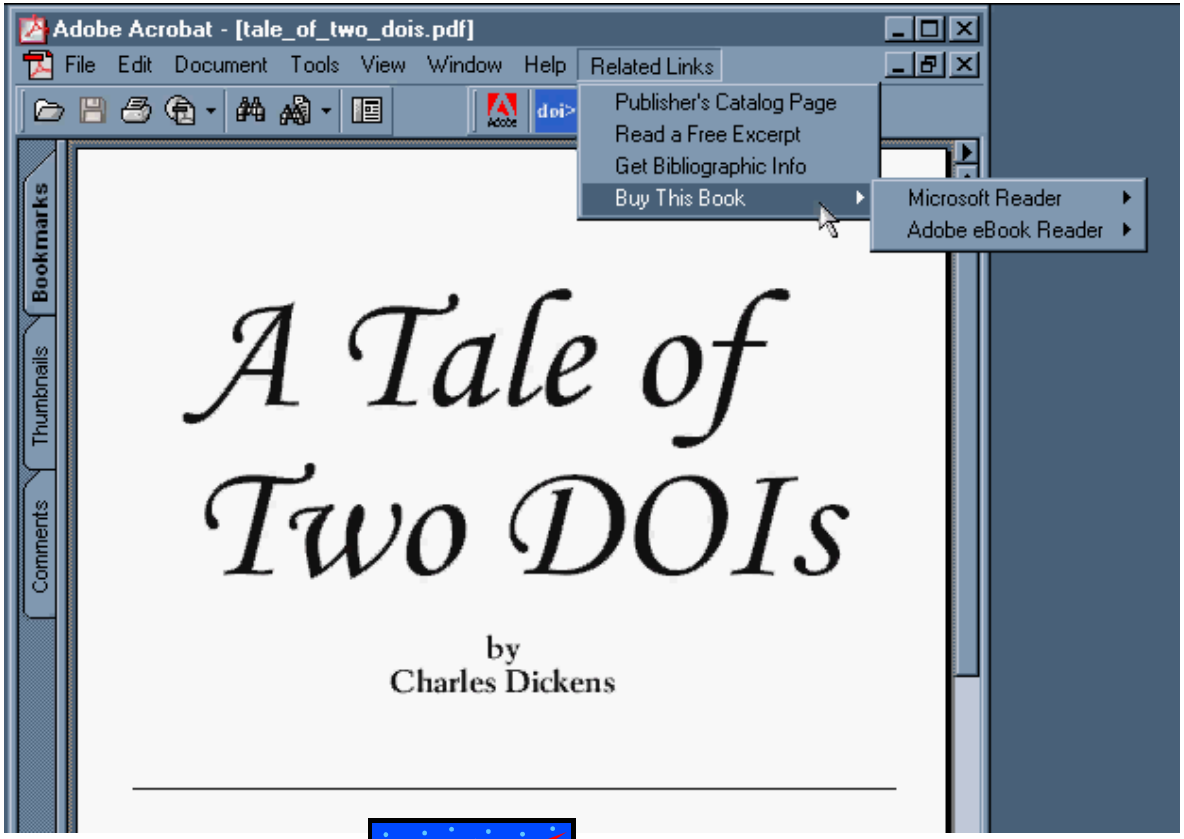

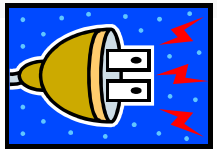

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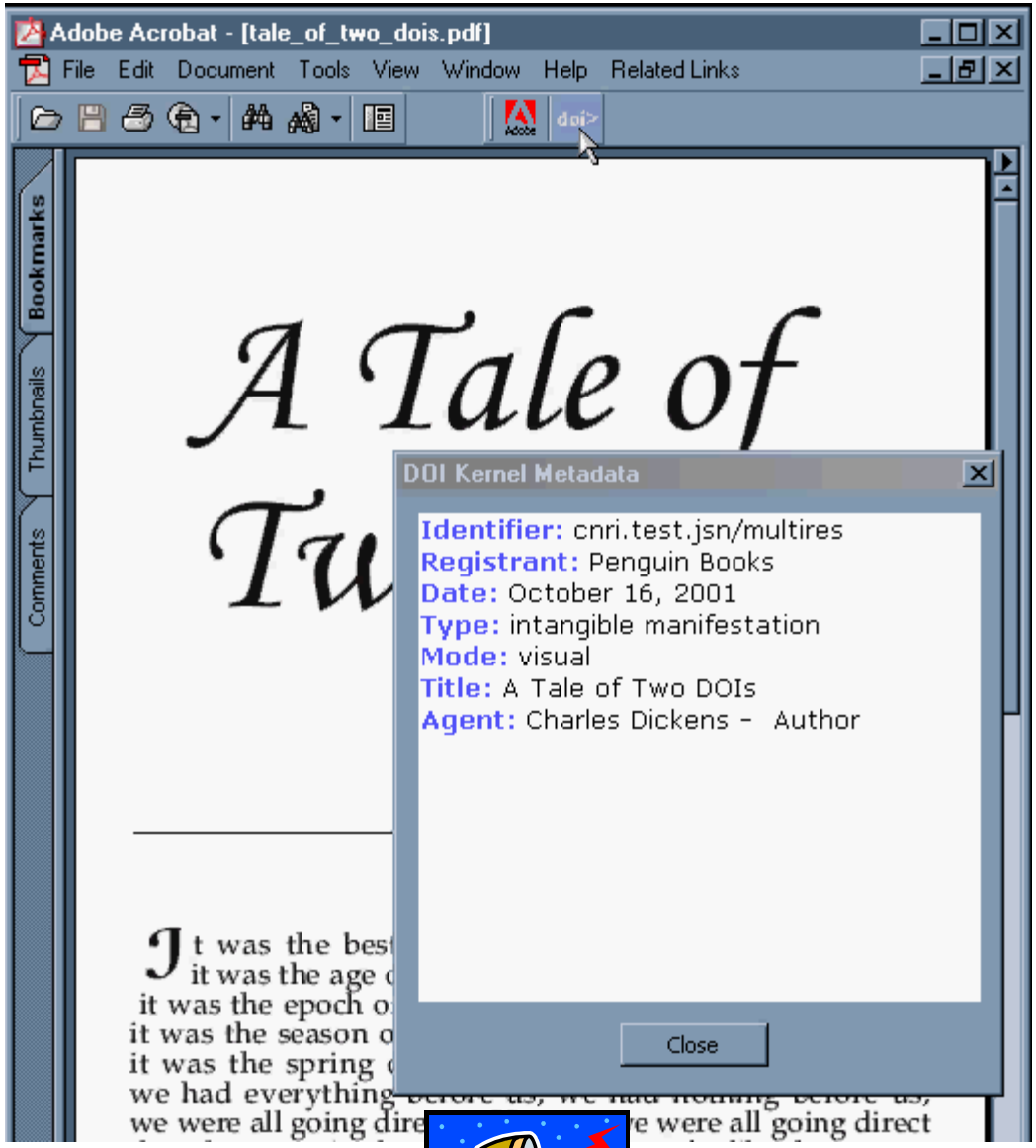
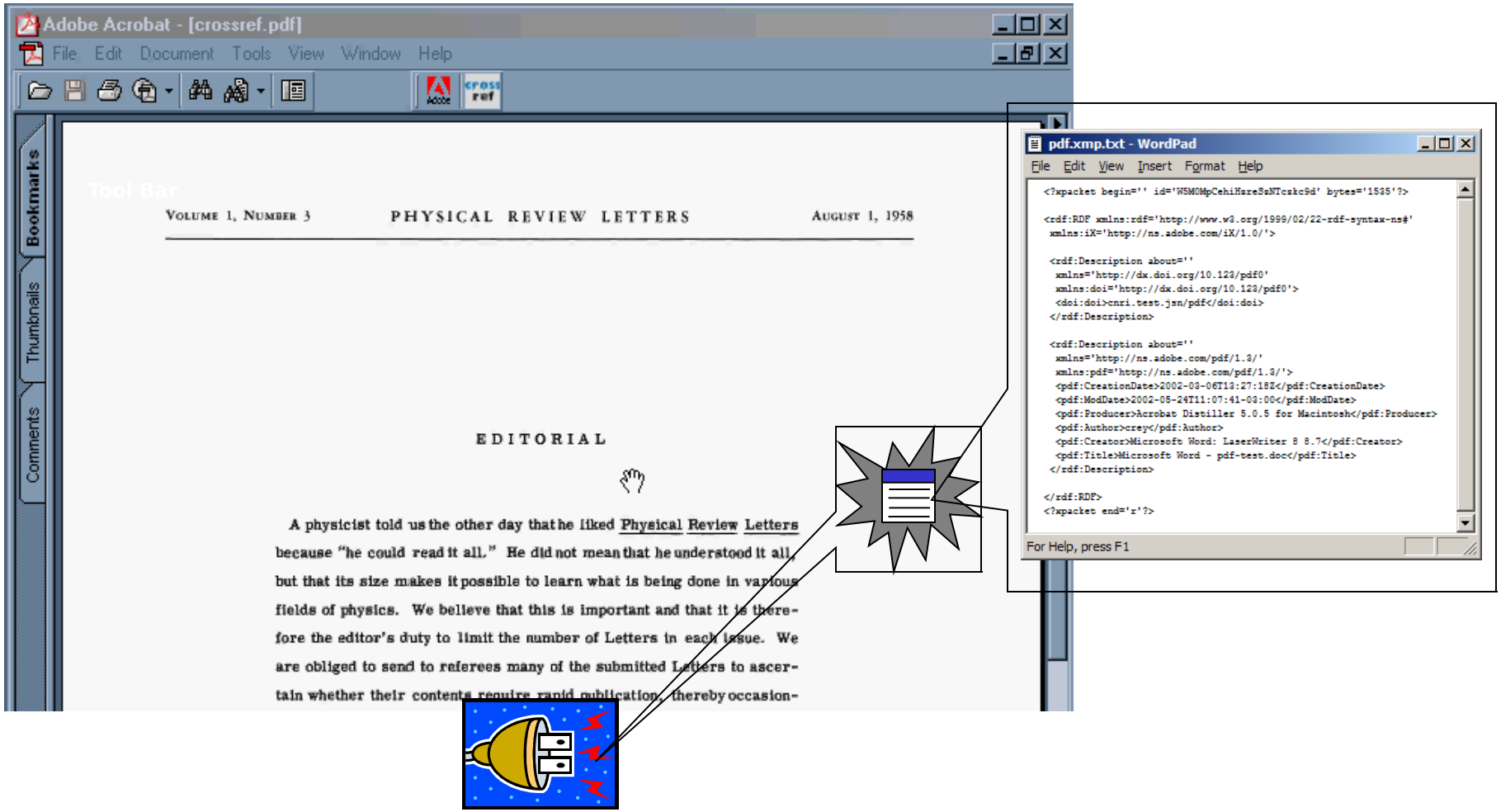
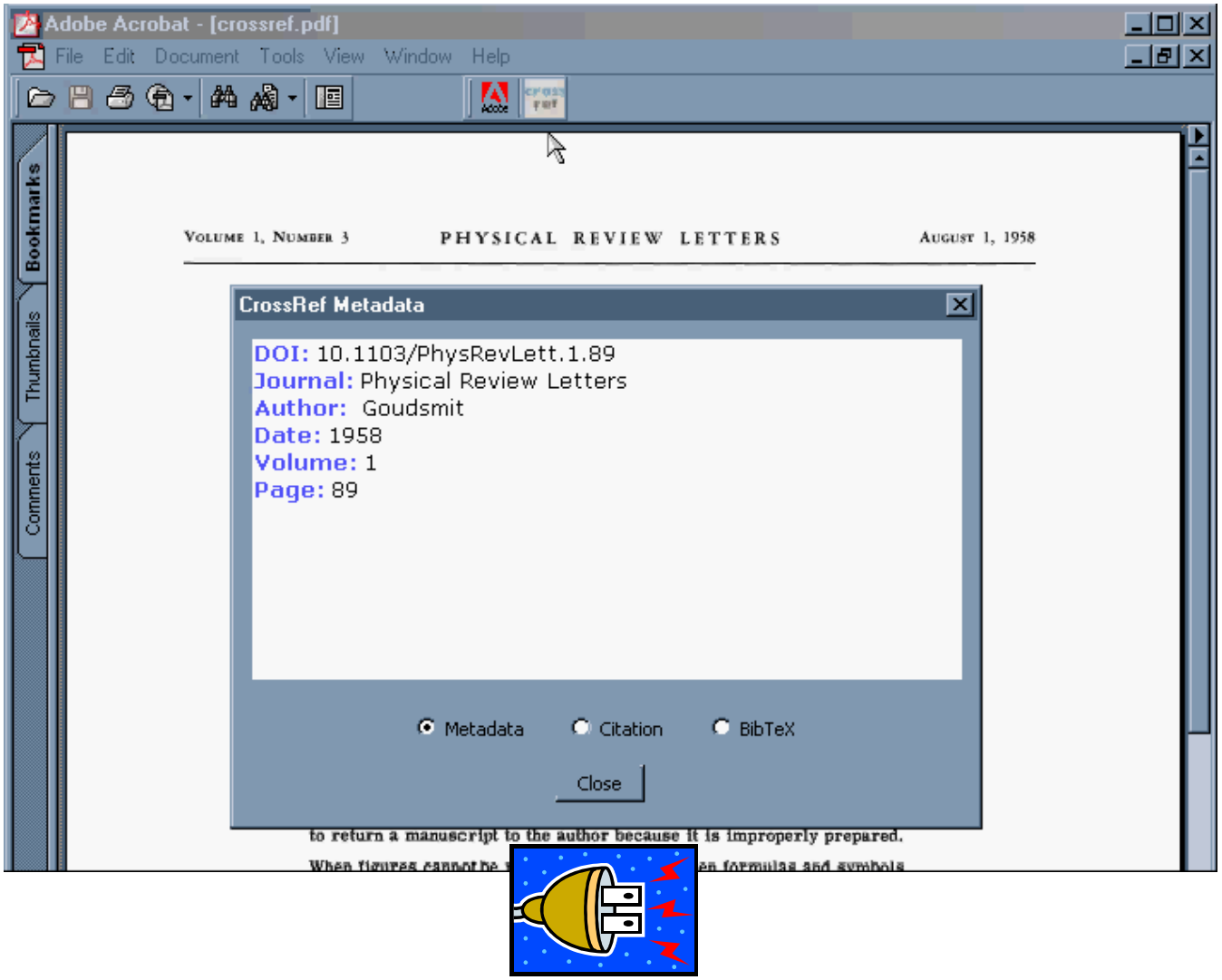


Demo 3 –Citation



Demo 3 –Citation



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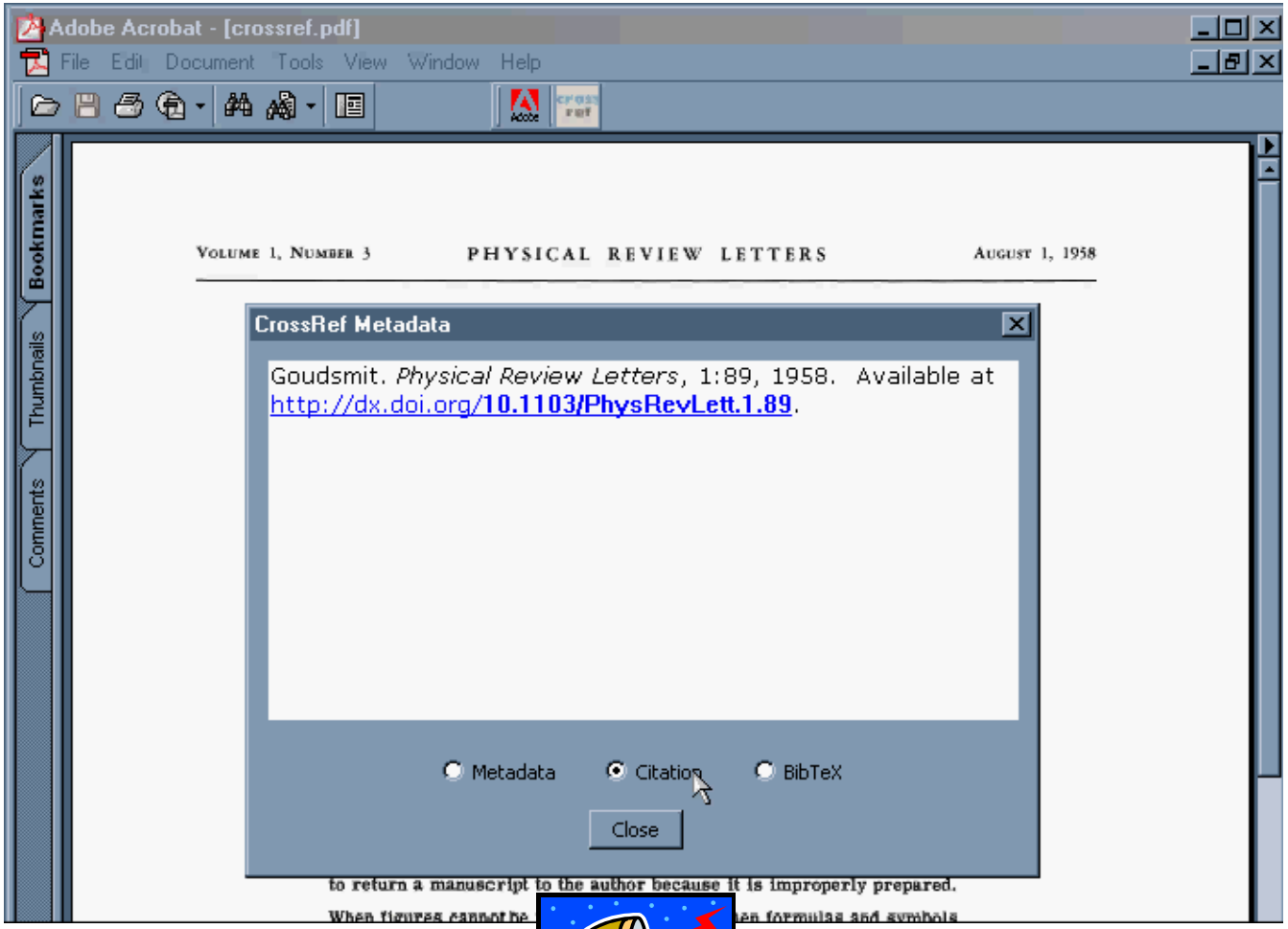

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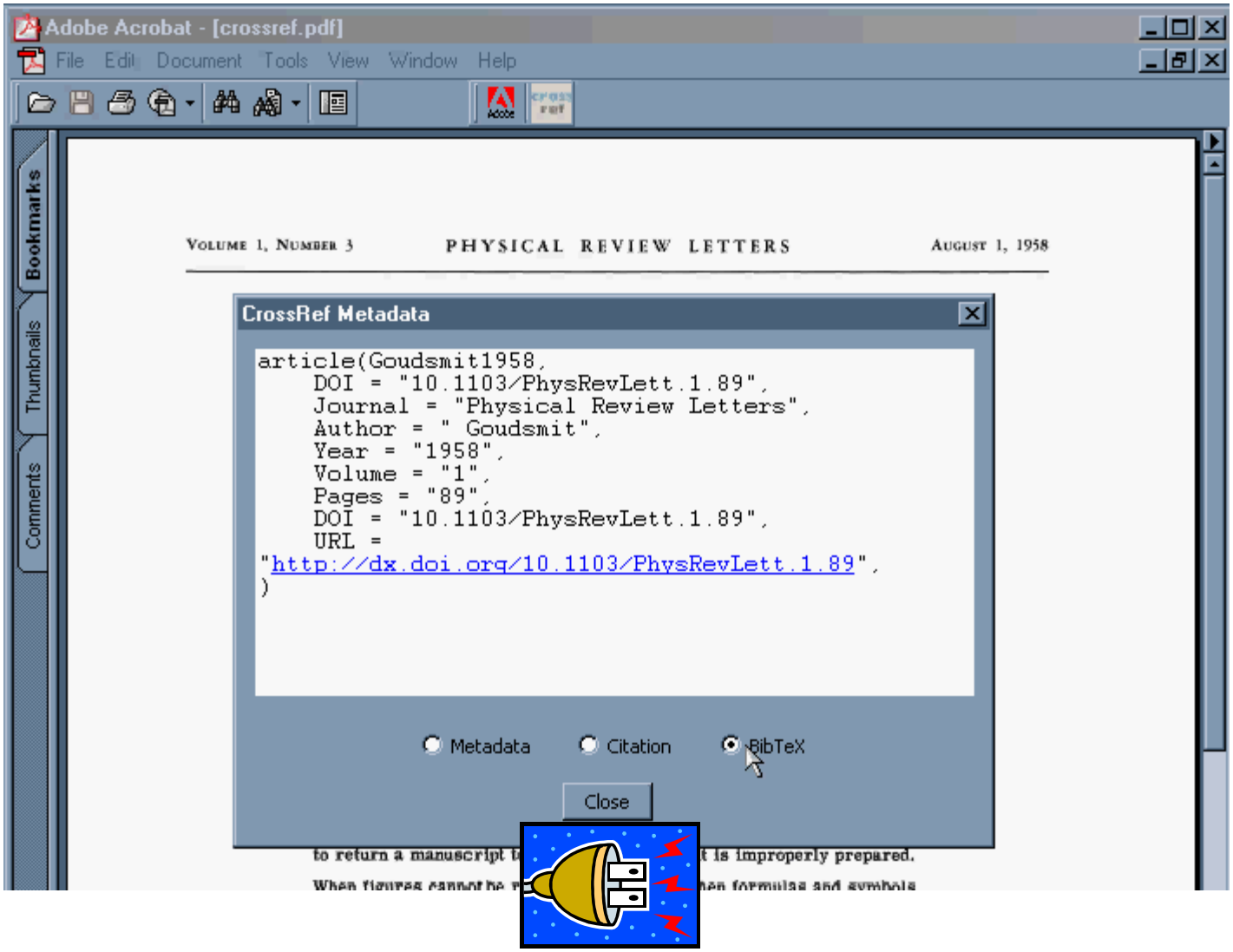
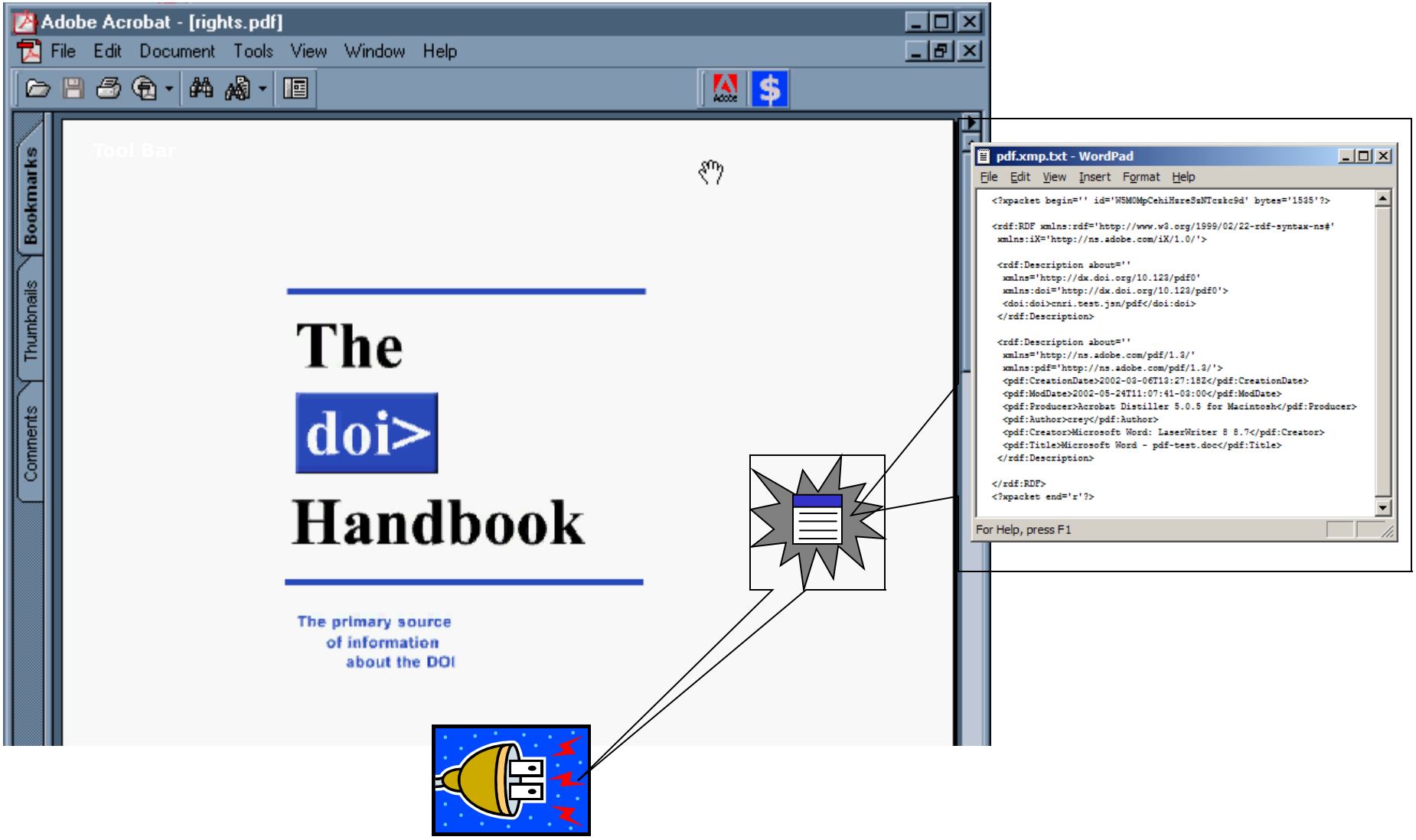


Demo 4 – Permissions



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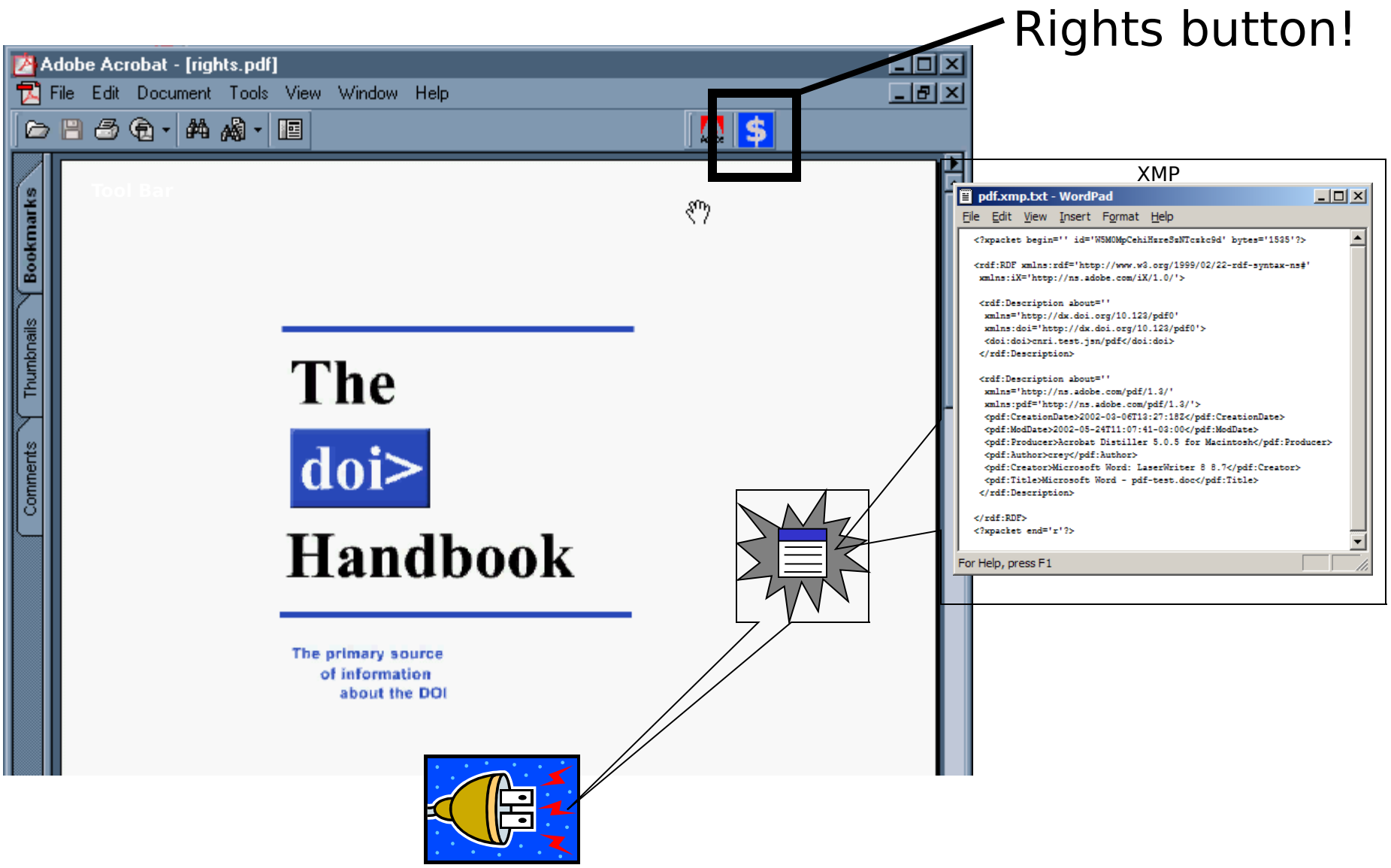

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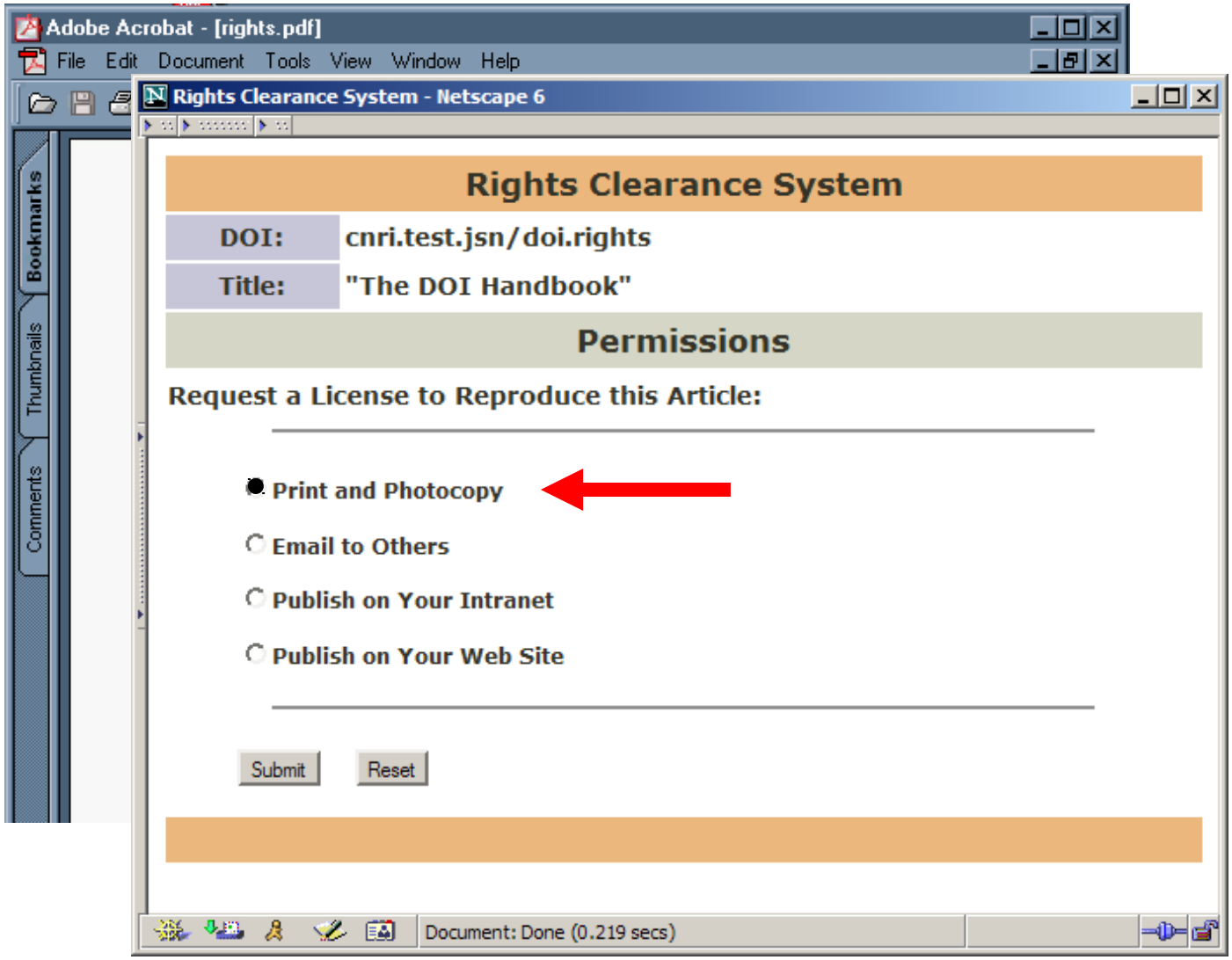

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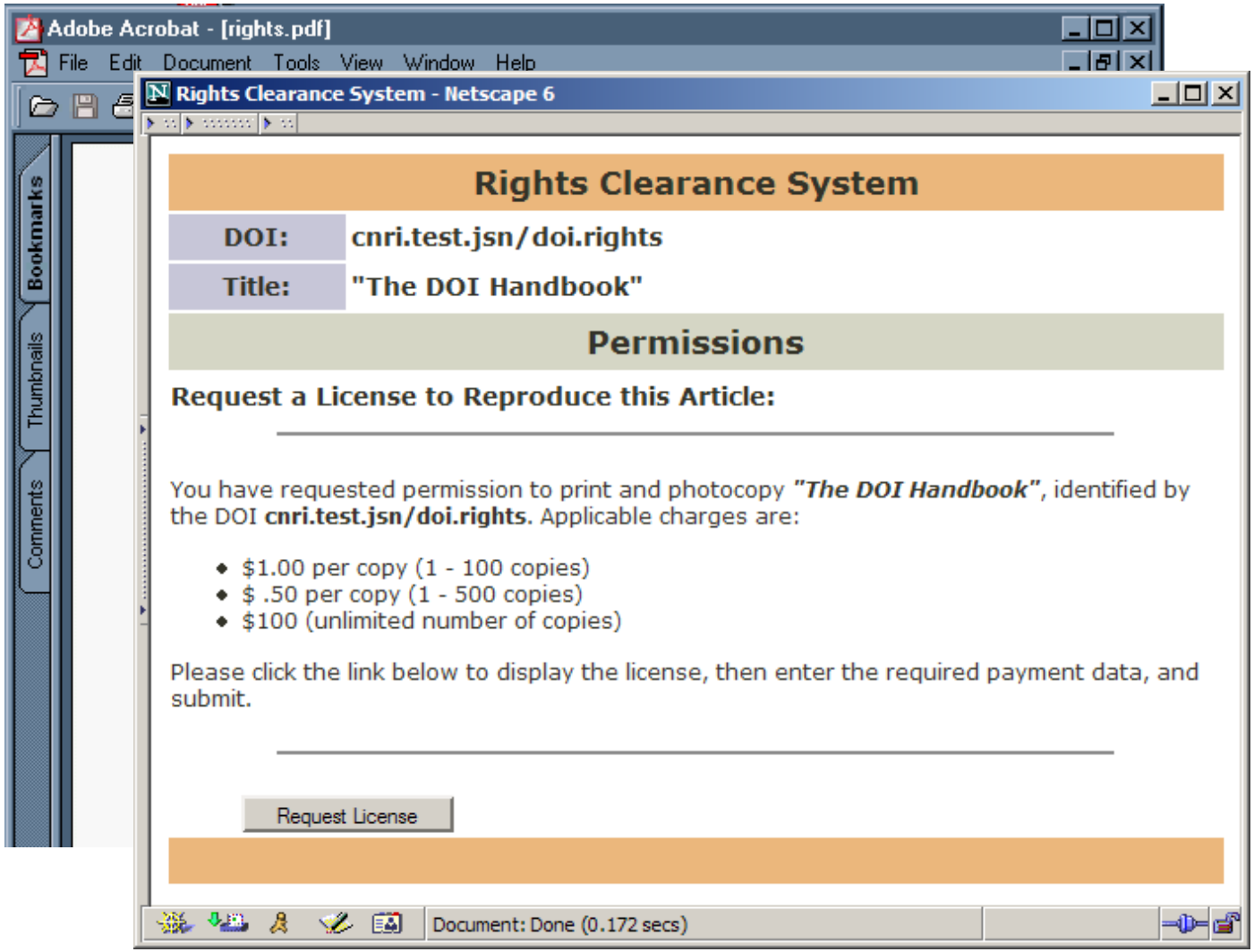
Adobe Acrobat - [rights.pdf]
File Edit Document Tools View Window Help
Bookmarks
Thumbnails
Comments
Rights Clearance System - Netscape 6
Rights Clearance System
DOI: cnri.test.jsn/doi.rights
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What we have done

- Put the DOI data in functional units in the DOI record [Handle]; and the knowledge of what to do with them in the client
  - Demonstrated with an end-user client (Acrobat) but equally applicable to middleware
  - No constraints on adding additional functional units to a given DOI
  - A common approach – could use same Handle record to manage pdf, html, mobile, etc., hence efficient in deploying content across platforms
  - The resolution to returned metadata through *Application Profiles* allows complex applications

- Provided a complete packaged solution: numbering, resolution, metadata, policies
  - On which individual applications and services can be built
  - The same additional components could be of interest to other Handle applications: metadata, policies
  - Avoid reinvention of the wheel

Handles in DOI

doi

10.123/456	URL	http://www....
	DOI_AP	10.AP/1; KMD; RA; URL
	DOI_AP	10.AP/2
	DOI_ATR	10.ATR/Latest; 22/10/2002
10.AP/2	Desc	Some description
	DOI_Service	10.Service/Metadata; Schema23; http://...
	DOI_Service	10.Service/Latest
10.Service/Metadata	Desc	Some description
	IDL	IDL description
	Java	Java Interface
	WSDL	Soap Binding
	IOR	IOR:0001100...
10.Service/Latest	Desc	Some description
	IDL	IDL description
	Java	Java Interface
	WSDL	Soap Binding
	IOR	IOR:0001100...

Created and maintained by Content Providers

AP (Service Aggregation) DOI to be defined and maintained by Registration Agencies

Service Description DOIs to be defined by service providers.

Who is using it now?

- Several hundred organisations
- Several million DOIs
- Examples:
- *CrossRef*
- *Content Directions Inc*
- *TSO The Stationery office* + others (Europe, US, Asia)
- Of special interest to CENDI:

  TSO – UK government documents
  Learning Objects Network - the ADL initiative
  Office of Publications of European Union*
  British Library*
  etc
  [*under discussion]

Who has done this?

- International DOI Foundation (IDF)
- Open member organisation, launched 1998
- Members; publishing, technology, intermediaries
- Modelled on W3C, and on the Bar code development
- www.doi.org

More information?

- Web site at http://www.doi.org
- DOI Handbook [http://www.doi.org/hb.html]
- DOI news [e mail sign up on site]
- DOI FAQs – in your pack [http://www.doi.org/faq.html]
- Metadata:
  - Indecs framework [http://www.indecs.org]
  - And see e.g. “Towards a Rights data Dictionary” [http://www.doi.org/topics/020522IMI.pdf]

Digital Object Identifier

Norman Paskin, International DOI Foundation

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